

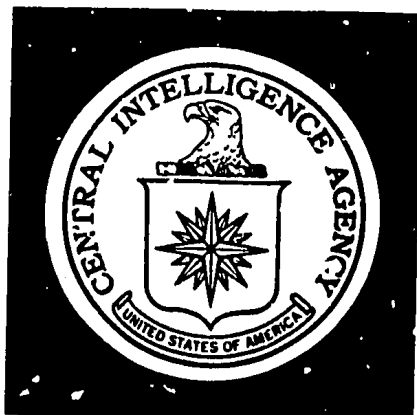
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**DIRECTORATE OF
INTELLIGENCE**

Intelligence Memorandum

*Communist China: Problems at the Lan-chou
Petrochemical Complex*

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
December 1968

INTELLIGENCE MEMORANDUM

Communist China: Problems at the Lan-chou
Petrochemical Complex

Summary

Between August 1964 and August 1965, Communist China purchased five petrochemical plants from the Free World valued at nearly US \$45 million to be located adjacent to the Lan-chou Petroleum Refinery. Although scheduled to be completed during 1967, the plants in the petrochemical complex still have not gone into operation. The Cultural Revolution has caused long delays in construction and created serious conflicts between China and the Free World firms involved in supplying the plants. During 1968 these conflicts culminated in the arrest and imprisonment of one European technician, the expulsion of all Free World personnel from Lan-chou, the continuing detention of a group of West Germans in Peking, the cancellation of the contract with Vickers-Zimmer Ltd., of the United Kingdom, and the subsequent trial in Peking of that firm for fraud. Relations between China and Western exporters of plant and technology have become strained because of these events, and this may be a handicap in future Chinese attempts to purchase complete plants from the Free World.

The output of the complex at full capacity would increase China's domestic production of plastics by about one-third and almost double the output of synthetic fibers. Delays in completion of the complex have been costly in terms of foregone output amounting to at least \$30 million per

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year. With the expulsion of all Free World personnel from Lan-chou and the cancellation of at least one contract, China will have to put the plants in the complex into operation without any on-site foreign supervision. Chinese engineering limitations and technical inexperience with these advanced processes will probably create serious complications. Operations at the complex probably will not reach designed specifications for quantity and quality of output.

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Problems at the Lan-chou Petrochemical Complex

1. Chinese Communist self-sufficiency in petroleum was assured by 1963 with the development of the large Ta-ch'ing oilfields in Manchuria. Between mid-1963 and 1966, China purchased modern chemical plants and technology from the Free World valued at about US \$95 million. More than 45 percent, by value, of these purchases were for the construction of a petrochemical complex at Lan-chou in Kansu Province. When completed, the output of the plants in the Lan-chou complex will significantly increase and diversify China's production of plastics and synthetic fibers, making the complex the most important facility in the infant Chinese petrochemical industry.*

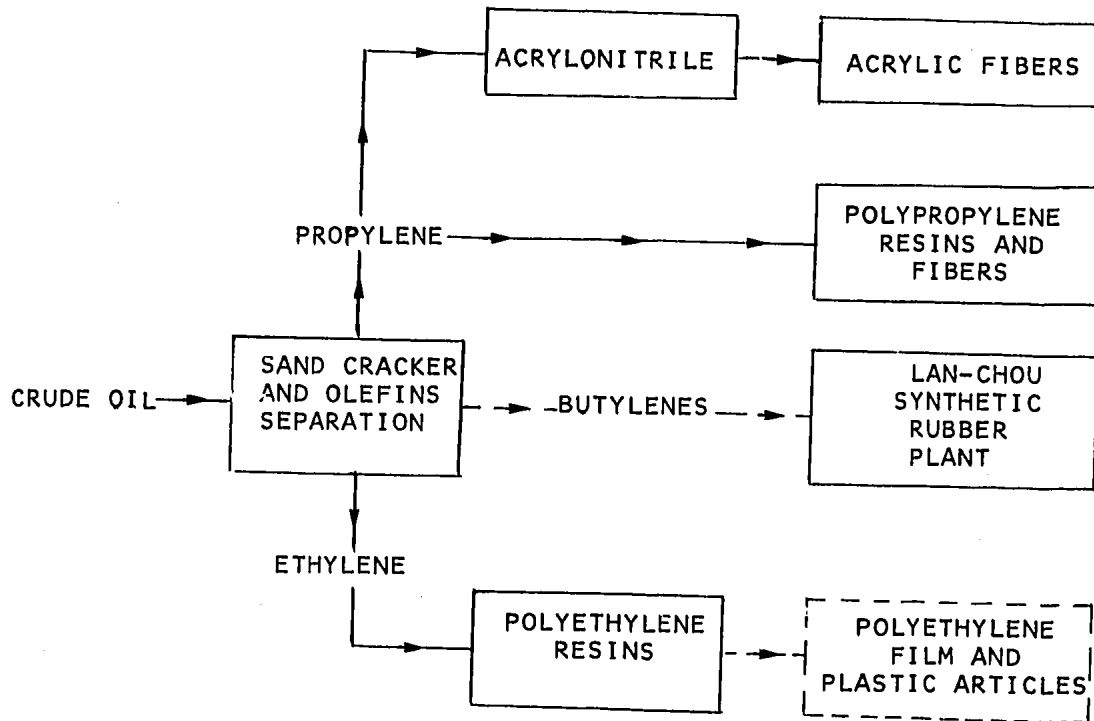
2. The Lan-chou complex basically consists of five plants: an olefins separation plant, a polyethylene plant, a polypropylene resins and fibers plant, an acrylonitrile plant, and an acrylic fiber plant. These plants were scheduled to be completed during 1967; however, it is clear that they still have not gone into operation. All Free World personnel connected with the plants have been ordered out of Lan-chou by the Chinese, and the regime claims that the plants will be put into operation without outside assistance. Nevertheless, the complex embodies some of the most advanced petrochemical processes available in the Free World, and Chinese capabilities for bringing these plants into operation are limited.

The Olefins Plant

3. The key plant in the Lan-chou complex is the olefins separation plant which supplies the necessary raw materials for the other plants, as shown in the following diagram:

* The location of Chinese petroleum and petrochemical facilities is shown on the map.

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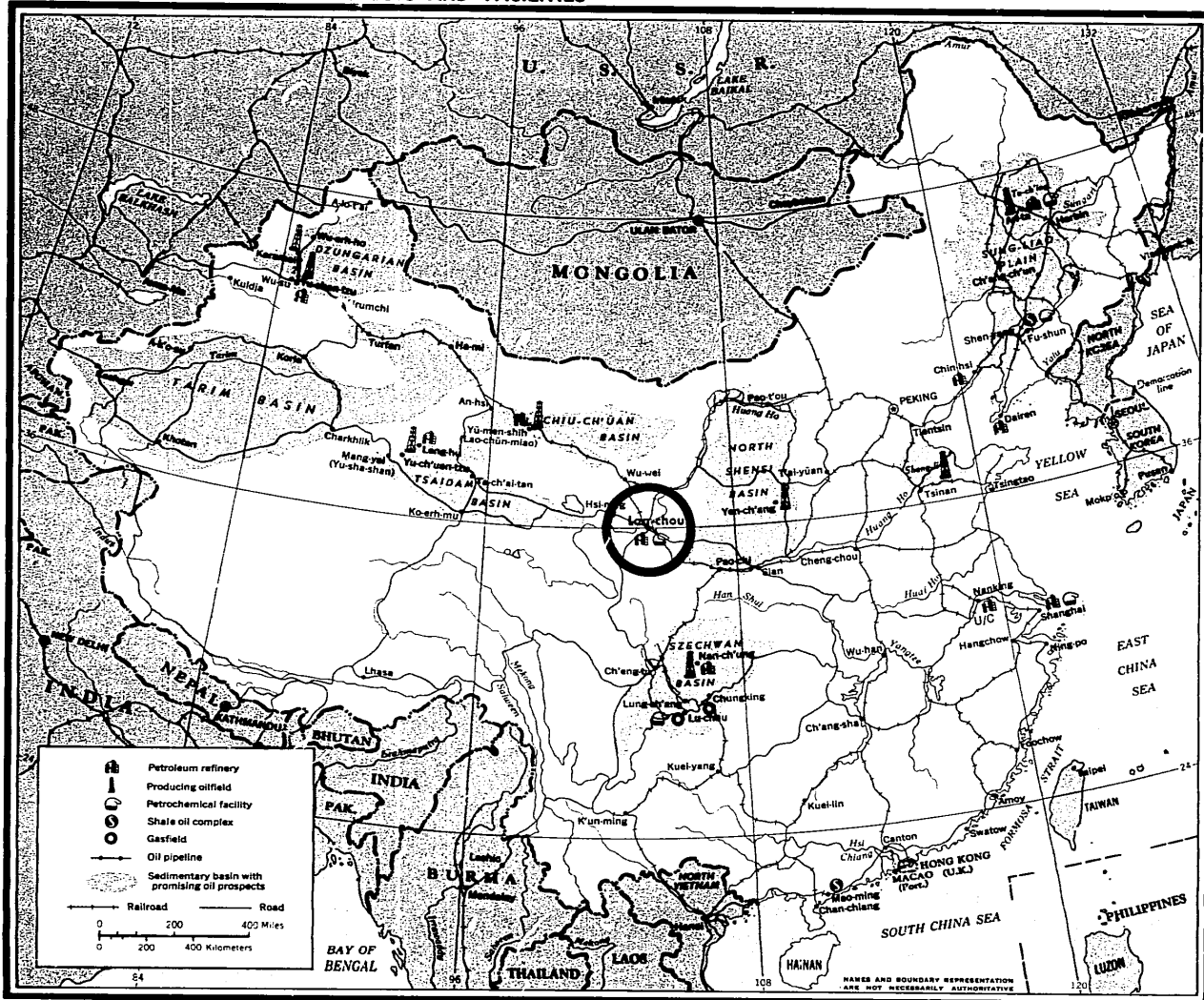
In August 1964, Communist China purchased a sand cracker* and olefins separation plant from the Lurgi firm of West Germany at a cost of about \$11.2 million. The plant, scheduled for completion by mid-1967, cracks crude oil from the adjacent Lan-chou Petroleum Refinery and then separates out the individual olefins. The estimated capacity of the olefins separation plant is 37,000 to 40,000 tons** of ethylene and 18,000 to 20,000 tons of propylene per year. One report has also indicated a capacity at the plant for the production of 14,000 to 15,000 tons per year of butylenes.

* A sand cracker is a fixed-bed refining unit employing sand as the carrier of the heat necessary to effect the decomposition of crude oil (or other feedstock) into olefins.

** All tonnages are in metric tons.

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Communist China: PETROLEUM PROSPECTS AND FACILITIES



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4. Ethylene from the olefins plant is used to produce low-density polyethylene at a plant purchased in September 1964 for about \$12.2 million from Simon-Carves Ltd. of the United Kingdom that uses the Imperial Chemical Industries process. This plant, originally scheduled for completion in mid-1967, has an annual capacity of 24,000 to 34,000 tons. The intended end use of the polyethylene is not specifically known; however, the output of this plant will probably be processed into commodities to supplement current imports of polyethylene products. China presently imports large quantities of polyethylene sheeting for agricultural uses as well as polyethylene tubes, piping, and other articles. If the plant produces only 24,000 tons per year, based on a factor of 1.1 ton of ethylene for 1 ton of polyethylene, there are 12,000 to 15,000 tons per year of ethylene available for other uses. One of the major uses of ethylene is for the manufacture of ethylene glycol which is a key intermediate in the manufacture of polyester fibers. China may intend to use any excess ethylene for production of that commodity.

The Polypropylene Resins and Fibers Plant

5. Propylene from the olefins plant is the raw material for the polypropylene resins and fibers plant purchased in November 1964 from Vickers-Zimmer Ltd. of the United Kingdom for approximately \$7.3 million. The plant, which was supposed to be completed in mid-1967, has a reported capacity of 15 tons per day of polypropylene resins, which are used to manufacture 10.2 tons per day of polypropylene fibers. If the plant were operated 330 days per year, its annual capacity would be 4,950 tons of resins and 3,350 tons of fibers. It is not known what will be done with the 4.8 tons per day of the excess resins; however, references to slit film have been seen. Slit film can be woven into sandbags and fertilizer sacks and fabric for other heavy-duty purposes. In the United States, the largest end use of slit film is for the manufacture of sandbags supplied to South Vietnam.

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The Acrylonitrile Plant

6. Propylene is also the raw material for the acrylonitrile plant purchased in May 1965 from the Lurgi firm of West Germany for about \$4.6 million. The plant was scheduled for completion by the fall of 1967 and has an annual capacity of 10,000 tons of acrylonitrile. The plant employs the Ammoxidation Process developed by Osterreichische Stickstoffwerke of Austria which is one of the most modern processes for the production of acrylonitrile in the world.

The Acrylic Fiber Plant

7. The acrylonitrile is polymerized and spun into acrylic fiber, probably through a wet spinning process using dimethyl formamide, at the plant purchased in August 1965 from Prinex Ltd., a subsidiary of Courtaulds, of the United Kingdom. The plant, costing China about \$8.4 million, was scheduled for completion in late 1967. The capacity of the plant has never been reported, but if all the acrylonitrile produced at the Lurgi plant is used, about 10,000 tons of acrylic fiber could be produced per year.

Butylenes Production

8. The olefins plant is also likely to produce butylenes, but the Chinese have given no indication of how the product would be used, although several good possibilities for its use do exist. A styrene-butadiene rubber and nitrile rubber plant built by the Chinese with Soviet assistance began production at Lan-chou in 1960. This plant has encountered numerous technical and material difficulties, and output at present is probably well below capacity. The butylene output could be used to augment the production of synthetic rubber. Operation of the synthetic rubber plant at full capacity would allow the regime to begin to re-orient the Chinese rubber-processing industry away from excessive dependence on natural rubber imports and toward development of a larger domestic synthetic rubber industry. An alternative use, in combination with the acrylonitrile produced at the complex, is for

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the production of ABS (acrylonitrile-butadiene-styrene) resins. These resins have high impact strength, high heat distortion strength, good electrical and low temperature properties, and are resistant to the action of most solvents, oils, and chemicals. They are among the most technologically advanced chemical products in the world.

Effects of the Cultural Revolution

9. Long delays have been encountered in the construction of the Lan-chou Petrochemical Complex. [redacted] construction has been completed and [redacted] most of the equipment has been installed, but none of the facilities have entered into production. Virtually all of these delays have been caused by the Cultural Revolution. [redacted]

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[redacted] Congestion in Chinese ports, principally Ta-ku and Shanghai, delayed the off-loading of imported equipment. Internal transportation disruptions caused by the Cultural Revolution further delayed delivery of the equipment from the ports to the site. [redacted]

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10. In July 1968, China canceled the contract and brought suit against Vickers-Zimmer of the United Kingdom for fraud allegedly involved in the execution of the polypropylene plant contract. Despite contract provision for arbitration in Stockholm in the event of dispute, the Chinese held a trial in Peking and awarded themselves about \$1.6 million in damages. Vickers-Zimmer representatives were not present for the trial, and the company has refused to pay. The chairman

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of Vickers-Zimmer has said that, despite the cancellation of the contract by the Chinese, financial losses to the company were unlikely to be heavy.

Economic Significance

11. The delays in completion of the complex have amounted to at least \$30 million per year in forgone output. Furthermore, relations between China and Western exporters of plant and technology have deteriorated during the Cultural Revolution, and this factor may be damaging in future Chinese attempts to purchase complete plants from the Free World.

12. The output of the polyethylene plant, some 24,000 to 34,000 tons per year, would increase China's plastics production by about one-third. On the basis of the cost to China of polyethylene imported from Japan, this plant would pay for itself in output in less than two years. A one-year delay in completion costs China, in addition to extra labor costs, about \$7 million to \$9 million in lost output. The output of the polypropylene fiber and acrylic fiber plants would about double Chinese domestic output of synthetic fibers. On the basis of the cost of imported Japanese acrylic fibers and in view of US domestic prices for polypropylene fibers, these plants would pay for themselves in value of output in less than a year. Loss of output forgone because of delays in completion cost the Chinese about \$20 million per year in these two plants alone.

13. All Free World personnel connected with the plants have been ordered out of Lan-chou, and the Chinese claim that they will begin operation of the plants without outside assistance.

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Because of the limitations of Chinese engineering and the lack of technical experience with this type of plant and process, it is doubtful that production will be up to designed standards. The other plant contracts

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have not been canceled, and the supplying firms are responsible for test runs and start-up. Nevertheless, Free World technicians will not be allowed at the plants to supervise these operations. This factor, combined with Chinese inexperience, will probably create serious complications, and operations at these plants will probably not reach contract specifications for quantity and quality of output.

14. Over the past 18 months, several of the Western firms involved in constructing the Lan-chou complex have expressed a desire not to have any future dealings with China. One UK firm has stated that it would not do further business with China because of the difficulties encountered. China has done nothing to improve the situation, but has aggravated conditions by demanding reductions in contract costs and by continuing to detain several Free World personnel for what appears to be leverage in negotiations. Even if other Free World companies do decide to undertake projects for China, it is likely to be difficult, if not impossible, to recruit technicians and engineers for work in China as long as the regime persists in its current xenophobic attitude.

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